ORIGINAL STUDY

POSSIBILITIES TO ANTICIPATE THE QUALITY OF LIFE AFTER PRIMARY TOTAL HIP ARTHROPLASTY

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ABSTRACT

The primary total hip arthroplasty is considered to be one of the most effective orthopaedic surgeries, resulting in a substantial improvement of the quality of life in the operated patients. Nevertheless, not all cases reach satisfactory outcomes, not being always able to determine the cause of this failure. A series of studies have tried to define the risk factors, obtaining contradictory results in this respect. This paper aims at making a prospective study on the influence of some risk factors that would lead to an unsatisfactory outcome, in 100 patients who underwent primary total hip arthroplasty and were consecutively included. The factors under study were gender, age, diagnosis requiring arthroplasty, functional status of contralateral hip, body mass index, prosthesis type. The preoperative and postoperative functional status was determined by the Harris Hip Score and by the quality of postoperative life, based on a SF-36 type questionnaire. The average results of the Harris Hip Score are very homogeneous, both pre- and postoperatively. Preoperatively, there is a statistically significant negative difference only in the group of patients aged over 75 and postoperatively, there is a statistically significant positive difference for obese patients. Herein we analyze how each studied risk factor may influence the functional status and the quality of life. The results show that among all risk factors considered in our study, only old age (>75) and a preoperative poor functional status may have a negative influence on the quality of life.

KEYWORDS: *quality of life, total hip replacement, rehabilitation, risk factors, age, preoperative functional status.*

1. Introduction

The primary total hip arthroplasty has gained its fame as the most effective orthopaedic surgery, succeeding in suppressing pain and in considerably improving functionality and consequently upgrading the quality of life in most cases. The modern manufacturing technologies and the materials used have resulted in extending the survival duration of the prosthesis up to 20 years on average. The surgery technique as well as the medical care procedures have made possible a dramatic decrease of mortality and of postoperative complications (deep vein thrombosis and pulmonary embolism, infections or mechanical degradation) and the functional recovery has improved and accelerated the social integration of patients. All these facts have determined the

expansion of indications in groups of patients to whom it was initially contraindicated to undergo a total hip arthroplasty, such as very old and young people, secondary coxarthroses [1]. In spite of a major cost of the implant, of the surgery and of the medical care, studies have demonstrated that the cost-effectiveness ratio is on the side of creating a new hip joint [2, 3]. The total hip arthroplasty was called "surgery of the century" [4].

However, not all patients achieve the same good outcomes, even under the conditions of a technically well performed surgery. A series of risk factors related to each patient are responsible for a weaker result and an unsatisfactory quality of life. The total hip arthroplasty consortium AMGA (**A**merican **M**edical **G**roup **A**ssociation) describes three categories of risk factors for an unsatisfactory postoperative outcome, as follows: demographic factors (age, gender, race, marital status, educational status and material income), medical factors (rheumatoid polyarthritis, comorbidities according to Charlson Index, obesity) and risk factors related to the preoperative functional status (pain and physical function) [5]. A number of publications are trying to determine, on smaller or larger samples, which are these risk factors [6–14] or, on the contrary, which are the factors for obtaining excellent outcomes [15].

Determining the factors inducing unsatisfactory results and an unsatisfactory quality of life is important for the therapeutic indications as well as for the pre- and postoperative ones. This way, the expansion of indications regarding the implantation of a total hip prosthesis could be delimited for the persons with a major risk of achieving unsatisfactory results and a postoperative recovery treatment could be determined, in order to control the risk factors.

Publications in the specialized literature are contradictory in terms of the capacity to anticipate the outcome, a capacity belonging to the multitude of studied factors. With regard to gender, for example, a

number of studies state that, in many cases, in comparison with men, women experience severe postoperative pains, which entails an unsatisfactory quality of life [16, 17], while other studies do not make any difference between genders as regards the postoperative results [5, 18, 19]. Moreover, a fairly recent study claims that, on the contrary, the female gender experiences less pain than the male gender after the implantation of a total hip prosthesis [20]. Similarly, old age would experience postoperative pains more frequently, what would be reflected in the quality of life [18, 21] or, on the contrary, there would be no differences related to age in the occurrence of pains, 6–12 months after the prosthesis implantation [5, 16]. The same contradictory results were also published with regard to other factors, considered to be risk factors, such as the body mass index, comorbidities, psychological factors, such as depression or anxiety etc.

As we are convinced of the possibilities of an individualized recovery treatment, of the improvement of functional results and of the quality of life in patients after total hip arthroplasty, this paper aims at analyzing the anticipative role of some demographic, medical and functional factors, which have to be taken into account in order to customize the rehabilitation programs.

2. Material and Methods

We have performed a prospective study in 100 operated patients with primary total hip prosthesis, consecutively included on the basis of some inclusion criteria (patients with primary total hip arthroplasty, irrespective of age, associated diseases, obesity degree or type of prosthesis implant, in which, three months later, it was possible to calculate the Harris Hip Score and the quality of life, according to a questionnaire derived from SF-36 and simplified).

The rehabilitation treatment started early for

all patients and it had an integrative orientation, focusing and insisting on regaining the daily functional activities. The movement amplitude and the muscle contraction force were secondary targets. When discharged from the hospital (5–7 days postoperatively), the patients were able to walk by themselves, with assistive means, and to enjoy an independence degree in performing their daily activities. All patients continued their rehabilitation at home, according to an individualized program received in written form at their discharge. At 3 months after the implantation of the total hip prosthesis and after rehabilitation, on the occasion of a medical control, the Harris Hip Score was calculated, comparing it to the preoperative score and the patients had to fill in a questionnaire, according to which the quality of their life was subsequently calculated.

The factors analyzed for their capacity to anticipate the outcome achieved at 3 months after surgery and rehabilitation were as follows:

- gender – the group included 58% females and 42% males;

- age – patients were divided into 4 categories, according to age: 9% under 40, 36% between 41 and 60, 44% between 61 and 11% over 75;

- body mass index – the group included 36% normal weight patients, 45% overweight patients and 19% obese patients;

- diagnosis requiring arthroplasty – primitive coxarthrosis in 60% of cases, secondary coxarthrosis due to a developmental dysplasia in 8% of cases, secondary coxarthrosis due to a femur head necrosis in15% of cases and other causes in 17% of cases;

- contralateral hip condition – a functionality that did not impede recovery in 56% of cases (the opposite hip was normal or operated) and a weaker functionality due to a coxarthrosis in 44% of cases;

- type of implanted prosthesis – cemented prosthesis in 34% of cases and uncemented prosthesis in 66% of cases.

In order to render objective the functional status pre- and postoperatively, the Harris Hip Score was used, which besides pain and mobility, also assessed a series of functional abilities necessary in daily life (putting one's shoes on, seating oneself, sitting down on a chair, climbing stairs, getting on transport means etc.), where the participation of the coxofemoral joint is essential. Considering that the main purpose of total hip arthroplasty is not to obtain a certain amplitude of movement, a certain degree of muscular strength or a complete disappearance of pain, but to gain a functionality as close to normal as possible, we opted for Harris Hip Score, which can assess this functionality [22, 23]. It is considered that the Harris score considerably improves if its functional part increases by at least 20 points as against the preoperative score [24]. In quality terms, depending on the score obtained, the result can be excellent (91–100 points), good (80–90 points), modest (71–79 points) or poor (under 70 points).

The quality of life 3 months after the prosthesis implantation and after rehabilitation was calculated on the basis of a questionnaire derived from SF-36 questionnaire and simplified [11, 25, 26]. In quality terms, depending on the summed-up points, the quality of life can be considered as excellent (91–100 points), very good (81–90 points), good (61–80 points), mediocre (35–60 points) or poor (under 35 points).

3. Results

In order to determine the predictive possibilities of the various studied factors, we took as starting points the average preoperative Harris score and the average score of the quality of life, calculated 3 months after the prosthesis implantation and after rehabilitation, for the whole group under study. Further on, the average preoperative Harris score, the

postoperative average Harris score and quality of life were calculated for each separate factor considered. The results obtained were statistically processed. The data were expressed as average values, standard deviations, percentages. The one-way ANOVA test (Bonferroni correction) and the t-test (Student) were used to assess the differences in the average quantitative calculations. The StataC 11 program (StataCorp LP, Texas, USA, version 2009) was used for the data analysis. The $p < 0,05$ value was considered statistically significant.

The preoperative average Harris score of the whole group under study was 40.06, with extreme limits between 18 and 60, and the postoperative average was more than twice the initial value of 85.89, varying between 35.50 and 98.75. Except for 4 cases, the rest of 96 cases registered a postoperative Harris score with a plus of minimum 20 points for the functional activities, as compared to the preoperative score. In terms of qualitative results, 8 patients had a poor result, 7 - a modest one, 47 - a good one and 38 - an excellent result. The patients assessed the quality of their life as amounting to 74.88 points on average (varying between 38 and 97), hence as being good on average (with variations between excellent and mediocre). Half of the patients (51%) interpreted the quality of life as being good, 31% assessed it as being very good, 7% considered it excellent and only 11% considered it as being mediocre.

For the various analyzed risk factors (Table I), the average value of the preoperative average Harris score oscillated around the average value of the group, without any statistically significant differences, with one exception.

The preoperative average Harris score for the group of patients aged over 75 was statistically significantly lower than the score for the other age groups and as against the average value of the whole group − 34.36 points as against 40.06 points ($p = 0.041 < 0.05$). (Table I). At 3 months after the

prosthesis implantation and after rehabilitation, there were no longer statistically significant differences between the postoperative average values of the Harris score for the various risk factors. The average assessment values of the quality of life for various groups of risk factors fell into the category assessed as good, without statistically significant differences, except for obese patients, who considered to have gained postoperatively, on average, a very good quality of life ($p = 0.004 < 0.05$) (Table I).

4. Discussions

The homogeneity of the average Harris scores, both preoperatively and at 3 months after surgery and rehabilitation, as well as the average values of the quality of life seem to indicate that, in general, the factors considered to be risk factors for the quality of the final outcome have not an important value of anticipation. The fact that for very old patients (aged over 75) the preoperative average Harris score is statistically significantly lower than the average score for other ages and in comparison with the average value of the group, is understandable. A coxarthrosis appearing at an older age determines a more severe impairment of the general functionality on the background of a rather unstable functional balance, of weaker muscles and of a long period of sedentary life, which is reflected in the Harris score value. After the prosthesis implantation and the early performance of an individualized and gradual rehabilitation, gradually introducing exercises against resistance (in order to strengthen the muscle mass), the postoperative Harris score was no longer statistically significantly different from the score of other age groups and in comparison with the postoperative average value of the whole group. The Harris score average was maintained, however, below the overall average of 81.65 (with extreme variations between 35.50 and

91.45), as compared to the group average value of 85.89, both being classified as good results. The average value of assessments on the quality of life, coming from these aged patients, was 66.45, classified as being a good quality, but in terms of value, much below the overall average (74.88). The ratings awarded by patients over 75 years of age for the quality of life varied from 2 excellent ratings to none for a very good quality, to 6 for a good quality and 3 for a mediocre one. We might say that very old people benefit from the implantation of a total hip prosthesis and that a functional recovery that is well managed and individualized can have a good functional outcome and, in most cases, a quality of life assessed at least as good.

The gender as risk factor, largely discussed and argued about in the specialized literature [7, 11, 14,17, 27, 28] appears in our statistics as having no value of prediction of the final outcome. The average Harris score at 3 months after surgery and rehabilitation was 86.05 for males and 85.65 for females, a difference that is not statistically significant (p=0.8569>0.05). Both average values were classified as good results. The quality of life after surgery and rehabilitation was 74.58 for males and 75.28 for females, a difference that is not statistically significant (p=0.7647>0.05).

Neither the diagnosis requiring arthroplasty, nor the functional status of the opposite hip and nor the type of implanted prosthesis – cemented or uncemented, were risk factors with possibilities to predict the quality of life gained postoperatively. The average Harris score and the average value of the quality of life varied around the overall average value, without statistically significant differences.

The body mass index, also largely debated upon in specialized literature [14, 21, 28-32] and considered by some authors as forecasting a postoperative unsatisfactory quality of life for obese patients, has not proved predictive qualities in our statistics. The postoperative average Harris score registered no statistically significant differences between normal weight, overweight and obese patients. The postoperative quality of life was considered by obese to be excellent as value, statistically significantly higher than the ratings for the quality of life of normal weight and overweight patients. Total hip arthroplasty, like other therapeutic surgical procedures, frequently determines the so-called "obesity paradox", the final outcome being better than the anticipated one [33].

The most frequent risk factor considered in the specialized literature to have a predictive capacity regarding the quality of life, is the preoperative functional status, determined by means of Harris or WOMAC scores [5, 7, 9, 10, 12, 15, 17, 18, 34, 35]. Using the Harris score for assessing the preoperative functional status, we have tried to determine whether the preoperative status has any predictive value regarding the quality of life. Out of the whole sample under study, 17 patients had a preoperative functional status assessed with a score lower than 35 points. The preoperative average Harris score under 35 points was 27.94 (with limits between 18 and 34). The average value at 3 months after surgery and rehabilitation was 82.62 (with limits between 35.50 and 98.50), a little under the average Harris score for the entire group, 3 months later (85.89) and statistically insignificant. The quality of life registered an average value of 66,88 points (good) and it was considered by patients in 2 cases as mediocre, in 9 cases as good, in 4 cases as very good and in 2 cases as excellent. In order to convince ourselves of the predictive role of the preoperative functional status, we also included in our selection the 23 patients who had preoperative Harris scores higher than 45 points. The preoperative average Harris score was of 48.78 points (with limits between 46 and 60), higher than the preoperative average Harris score for the whole sample. (40.06). The

average Harris score at 3 months after the prosthesis implantation was of 86.09 points (with limits between 47.20 and 100), almost 4 points above the average value for patients with a Harris score below 35 points and a little above the average value of the whole sample (85.89).

Table I . *Harris score and Quality of life, 3 months after the prosthesis implantation*

		Preoperative average Harris score	Postoperative average Harris score	Quality of life – average
	All patients	40.06	85.89	74.88 (good)
Age of patients	<40	39	86.70	74.80 (good)
	41 – 60	41.10	81	77.10 (good)
	61 – 75	41.75	86.65	73 (good)
	>75	34.36 (p=0.041<0.05)	81.65	66 (good)
Gender of patients	♀		85.65	75.28 (good)
	♂		86.05	74.48 (good)
Contralateral hip	Functional		86.43	76.03 (good)
	With coxarthrosis		85.19	73.40 (good)
Diagnosis	Primary coxarthrosis	41.23	86.32	73.98 (good)
	Secondary coxarthrosis due to dysplasia	40.50	90.41	81.12 (very good)
	Secondary coxarthrosis due to necrosis	40.80	85.25	77.73 (good)
	Other causes	35.05	83.59	72.58 (good)
Type of prosthesis	Cemented		87.04	74.05 (good)
	Uncemented		85.26	75.30 (good)
Body Mass Index	Normal-weight	39.80	84.60	70.97 (good)
	Overweight	40.40	84.48	75.13 (good)
	Obese	39.73	91.63 (p=0.004<0.05)	81.68 (very good)

The postoperative quality of life registered an average value of 76 points, almost 10 points higher than the average value obtained by the patients with a preoperative Harris score below 35 points and it was considered to be mediocre in 4 cases, good in 7 cases, very good in 10 cases and excellent in 1 case. While within the group with a preoperative average Harris score below the overall average, at 3 months postoperatively, the assessment of the quality of life as good was prevailing (9 of 17 cases), within the group with a preoperative average Harris score above the overall average, the assessment of the quality of life as very good was prevailing (10 of 22 cases). We can conclude that the predictive value of the preoperative functional status is real, but indicative only, since in both groups of patients there existed cases with a mediocre quality of life and cases with an excellent quality of life.

5. Conclusions

The functional status is well defined by the Harris Hip Score, investigating both pain and daily life activities, necessary for the patient's independence. By comparing the Harris score preoperatively and postoperatively, the functional gain of the patient after the implantation of a primary total hip prosthesis was rendered evident. By comparing the preoperative and postoperative Harris scores, we emphasized the functional gain obtained by the patient as a result of a primary total hip

prosthesis implantation. The quality of life, calculated according to questionnaires of SF-36 type, revealed the satisfaction obtained by the patients postoperatively and post-rehabilitation. The possibilities to anticipate the quality of life obtained by the patients, due to a number of risk factors, are largely discussed in the specialized literature and there is no consensus on their value. Out of the risk factors that we investigated (age, gender, diagnosis requiring arthroplasty, functional status of the hip opposed to the operated one, body mass index, type of implanted prosthesis – cemented or uncemented, preoperative functional status of the patient) only the old age of over 75 and the preoperative functional status of the patient have predictive virtues, but indicative only, for groups but not individually, for each operated patient. Even in case of disadvantaged groups (very old people, obese, poor functional status postoperatively), a well-managed and individualized rehabilitation can result in a quality of life considered to be at least good.

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